

**Total Dose Test Results:
OP27A Low-Noise, Precision, Operational Amplifier.**

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**NASA/GSFC
25th January 2006**

1. Introduction

This report describes the results of radiation testing and characterization of the OP-27A using gamma rays. Testing was done in January 2006.

2. Part Information

Table I contains information on the part. Fig. 1 shows the pin-out.

Table I.
Test and Part Information

Generic Part Number:	OP27A
Full Part Number	M38510/13503BGA
Manufacturer:	Analog Devices
Lot Date Code (LDC):	0448
Quantity Tested:	4
Serial Numbers of Control Sample:	#1
Serial Numbers of Radiation Samples:	#2, #3, #4, #5
Part Function:	Low-Noise, precision operational amplifier
Part Technology:	Linear Bipolar
Package Style:	DIP (8 pins)
Test Equipment:	Parametric Analyzer
Test Engineer:	Craig Stauffer
Dose Levels (krad (Si))	0, 5, 10, 15, 20, 30, 40
Target dose rate (rad (Si)/min)	0.02 krad(Si)/s

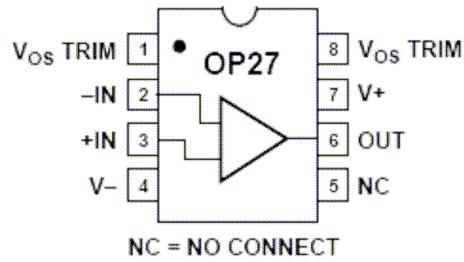


Fig. 1. Pin-out for the OP27A

3. Test Method

There are five devices. Four devices were exposed to gamma rays using the GSFC Co⁶⁰ source. One device was used as a control. During irradiation the parts were biased as shown in Fig. 2. Dose levels were 0, 5, 10, 15, 20, 30, & 40 krad (Si) and the dose rate was 0.02 rads(Si)/s. After each exposure the devices were characterized using a parametric analyzer.

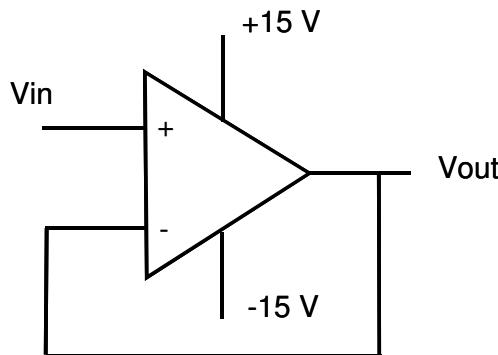


Fig. 2. Bias Circuit. Vout was left floating, Vin was grounded and the supply was +/-15 V. The same circuit was used when doing the electrical tests with the parametric analyzer.

4. Results

The following tables contain the results of the parametric measurements.

Table II
Input Offset Voltage (V) as a Function of Total Dose

TID	Control	DUT_A2	DUT_A3	DUT_A4	DUT_A5	Average	St. Dev.
0	-1.56E-05	-2.90E-05	-4.83E-05	-3.95E-05	-2.76E-05	-3.61E-05	9.72E-06
5	-4.03E-05	-5.07E-05	-6.47E-05	-6.29E-05	-5.11E-05	-5.73E-05	7.48E-06
10	-1.65E-05	-4.72E-05	-5.82E-05	-5.41E-05	-4.67E-05	-5.15E-05	5.56E-06
15	-2.83E-05	-5.01E-05	-5.73E-05	-5.87E-05	-5.45E-05	-5.52E-05	3.78E-06
20	-7.18E-06	-3.01E-05	-4.09E-05	-3.34E-05	-2.66E-05	-3.28E-05	6.09E-06
30	-8.87E-07	-2.99E-05	-3.65E-05	-3.65E-05	-2.62E-05	-3.23E-05	5.11E-06
40	-1.30E-05	-3.61E-05	-3.66E-05	-3.50E-05	-2.62E-05	-3.35E-05	4.87E-06
50	-2.18E-05	-3.70E-05	-6.25E-05	-5.54E-05	-4.42E-05	-4.98E-05	1.14E-05

(These results cannot be compared with the specifications in the data sheet as they were not measured in the same configuration.)

Table III
Input Offset Current (A) as a Function of Total Dose
(Max. = 3.5E-08 A)

TID	Control	DUT_A2	DUT_A3	DUT_A4	DUT_A5	Average	St. Dev.
0	1.06E-08	3.86E-09	4.32E-09	2.00E-09	4.55E-09	3.68E-09	1.16E-09
5	1.08E-08	6.59E-10	2.35E-09	4.38E-10	3.27E-09	1.68E-09	1.36E-09
10	1.10E-08	3.49E-09	3.27E-09	-6.49E-10	4.20E-09	2.58E-09	2.19E-09
15	1.11E-08	7.10E-09	9.03E-09	8.92E-10	8.84E-09	6.47E-09	3.82E-09
20	1.10E-08	1.77E-08	1.89E-08	6.75E-09	2.28E-08	1.65E-08	6.88E-09
30	1.10E-08	4.79E-08	4.29E-08	2.36E-08	4.70E-08	4.03E-08	1.14E-08
40	1.11E-08	7.27E-08	6.67E-08	4.42E-08	7.21E-08	6.39E-08	1.34E-08
50	1.02E-08	9.02E-08	8.06E-08	6.39E-08	9.26E-08	8.18E-08	1.30E-08

Table III
Input Bias Current (A) as a Function of Total Dose
(Max. = 4.0E-08 A)

TID	Control	DUT_A2	DUT_A3	DUT_A4	DUT_A5	Average	St. Dev.
0	1.06E-08	3.86E-09	4.32E-09	2.00E-09	4.55E-09	3.68E-09	1.16E-09
5	1.08E-08	6.60E-10	2.36E-09	4.40E-10	3.27E-09	1.68E-09	1.36E-09
10	1.10E-08	3.49E-09	3.26E-09	-6.51E-10	4.20E-09	2.57E-09	2.19E-09
15	1.11E-08	7.11E-09	9.03E-09	8.92E-10	8.85E-09	6.47E-09	3.82E-09
20	1.10E-08	1.77E-08	1.89E-08	6.75E-09	2.28E-08	1.65E-08	6.88E-09
30	1.10E-08	4.79E-08	4.29E-08	2.36E-08	4.70E-08	4.03E-08	1.14E-08
40	1.11E-08	7.27E-08	6.67E-08	4.42E-08	7.22E-08	6.39E-08	1.34E-08
50	1.02E-08	9.02E-08	8.06E-08	6.39E-08	9.26E-08	8.18E-08	1.30E-08

5. Conclusion

The parts go out of specification between 20 and 30 krad(Si).